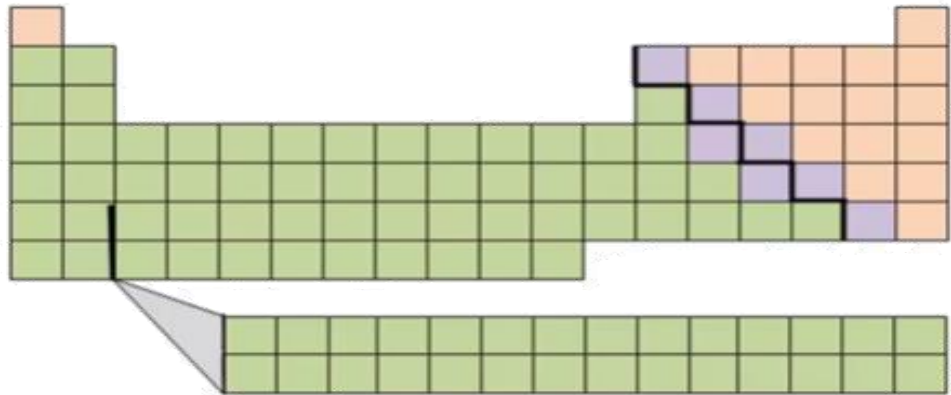


Topic 4: The Periodic Table

1.008 1 H Hydrogen																	4.003 2 He Helium		
6.941 3 Li Lithium	9.012 4 Be Beryllium																	18.998 8 F Fluorine	20.180 10 Ne Neon
22.990 11 Na Sodium	24.305 12 Mg Magnesium																	35.453 17 Cl Chlorine	39.948 18 Ar Argon
39.098 19 K Potassium	40.078 20 Ca Calcium	Sc Scandium	Ti Titanium	V Vanadium	Cr Chromium	Mn Manganese	Fe Iron	Co Cobalt	Ni Nickel	Cu Copper	Zn Zinc	Ga Gallium	Ge Germanium	As Arsenic	Se Selenium	Br Bromine	79.904 35 Kr Krypton		
84.468 37 Rb Rubidium	87.62 38 Sr Strontium	Y Yttrium	Zr Zirconium	Nb Niobium	Mo Molybdenum	Tc Technetium	Ru Ruthenium	Rh Rhodium	Pd Palladium	Ag Silver	Cd Cadmium	In Indium	Sn Tin	Sb Antimony	Te Tellurium	126.904 53 I Iodine	131.294 54 Xe Xenon		
132.905 55 Cs Cesium	137.328 56 Ba Barium	57-71		178.49 72 Hf Hafnium	180.948 73 Ta Tantalum	183.84 74 W Tungsten	186.207 75 Re Rhenium	186.207 76 Os Osmium	192.227 77 Ir Iridium	195.084 78 Pt Platinum	196.967 79 Au Gold	200.592 80 Hg Mercury	204.383 81 Tl Thallium	207.2 82 Pb Lead	208.980 83 Bi Bismuth	[208.980] 84 Po Polonium	209.987 85 At Astatine	222.018 86 Rn Radon	
223.020 87 Fr Francium	226.025 88 Ra Radium	89-103		[261] 104 Rf Rutherfordium	[262] 105 Db Dubnium	[266] 106 Sg Seaborgium	[264] 107 Bh Bohrium	[269] 108 Hs Hassium	[269] 109 Mt Meitnerium	[269] 110 Ds Darmstadtium	[272] 111 Rg Roentgenium	[277] 112 Cn Copernicium	Unknown 113 Uut Ununtrium	[289] 114 Fl Flerovium	Unknown 115 Uup Ununpentium	[298] 116 Lv Livermorium	Unknown 117 Uus Ununseptium	Unknown 118 Uuo Ununoctium	
Lanthanide Series		138.905 57 La Lanthanum	140.116 58 Ce Cerium	140.908 59 Pr Praseodymium	144.243 60 Nd Neodymium	144.913 61 Pm Promethium	150.36 62 Sm Samarium	151.964 63 Eu Europium	157.25 64 Gd Gadolinium	158.925 65 Tb Terbium	162.500 66 Dy Dysprosium	164.930 67 Ho Holmium	167.259 68 Er Erbium	168.934 69 Tm Thulium	173.055 70 Yb Ytterbium	174.967 71 Lu Lutetium			
Actinide Series		227.028 89 Ac Actinium	232.038 90 Th Thorium	231.036 91 Pa Protactinium	238.029 92 U Uranium	237.048 93 Np Neptunium	244.064 94 Pu Plutonium	243.061 95 Am Americium	247.070 96 Cm Curium	247.070 97 Bk Berkelium	251.080 98 Cf Californium	[254] 99 Es Einsteinium	257.095 100 Fm Fermium	258.1 101 Md Mendelevium	259.101 102 No Nobelium	[262] 103 Lr Lawrencium			

In this lesson you will learn:

- ❑ how to classify elements based on their properties as metals, non-metals, and metalloids.
- ❑ how to find metals, non-metals, and metalloids on the periodic table.



Properties of Elements

- Everything around us is made of one or more elements.



Wires are made of
copper

(Cu-29)

special

cupric-Cu



Diamonds are made of
carbon

(C-6)



Milk & cheese contain
calcium

(Ca-20)

- Each kind of element has unique **properties**. (Singular = **property**)

Property - There are two definitions of the word “property”

1. An object **owned** by someone.

Example: “That book is my property.”

Your example: My phone is my property
because I own it.

-Something about -/oa that is different.

2. A **trait** of a **non-living** thing. (This is the definition we will use in chemistry)

Example: "One property of air is that we cannot see it."

Your example: One property of the paper is that it is green.

Another example: One property of water is that it does not have a smell.

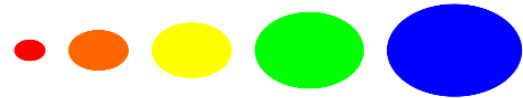
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Properties of Elements

- No two elements are exactly the **same**, but there are elements that share some of same **properties**.
- Next, we will look at a way to **classify** elements based on their properties.

Remember: To **classify** means to put objects in groups that are the same in some way

Shape



Size



Appearance



Classifying Elements

- The elements can be classified into 3 groups based on their properties: **metals**, **non-metals**, and **metalloids**.

Properties of Metals

- **Shiny**
- Good conductors of electricity
- Good conductors of heat
- Can **bend** or **stretch**
- **Solid** at room temperature (except **Mercury (Hg)**, a liquid)

allows it to pass through



Properties of Non-Metals

- Dull (the opposite of shiny)
- Do not conduct electricity
- Not good conductors of heat
- Do not bend or stretch as elements
- Solid, liquid, or gas at room temperature



Carbon



Neon

Helium



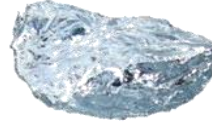
Carbon

N Nitrogen 7 Protein	O Oxygen 8 Air	F Fluorine 9 Toothpaste
P Phosphorus 15 Bones	S Sulfur 16 Eggs	Cl Chlorine 17 Swimming Pools



Properties of Metalloids

- **Mix** of metal and non-metal properties.
- **Semi-conductors** (We can control the electricity that goes through them. This is why metalloids are often used in electronic devices such as **phones** and **computers**.)
- **Solid** at room temperature
- Some are **shiny** but others are **dull**.



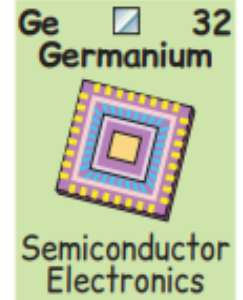
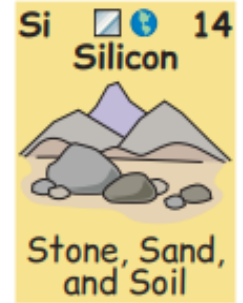
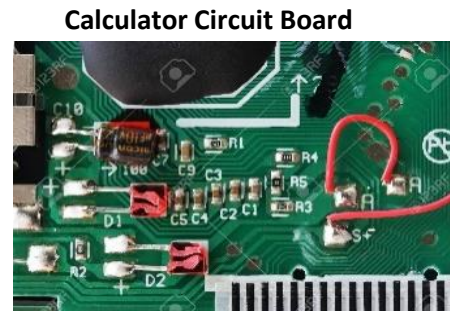
Silicon



Germanium



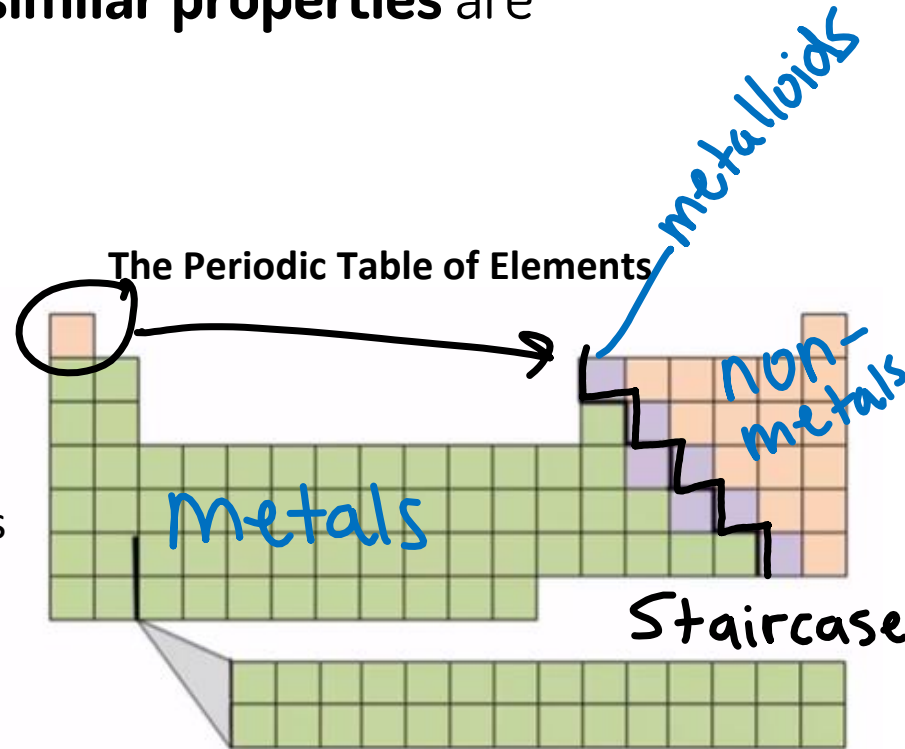
Arsenic



The Periodic Table

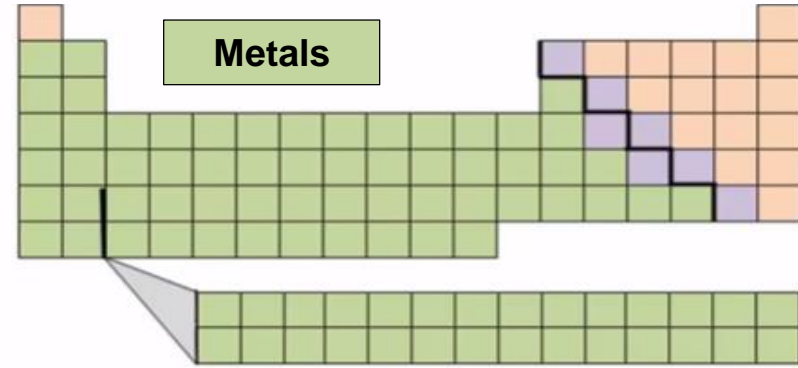
- On the periodic table, elements with **similar properties** are placed **together**.
 - Metals** are to the right of the staircase *left*
 - Non-metals** are to the left of the staircase *right*
 - Metalloids** are **touching** the staircase

- Metals
- Non-metals
- Metalloids



Metals

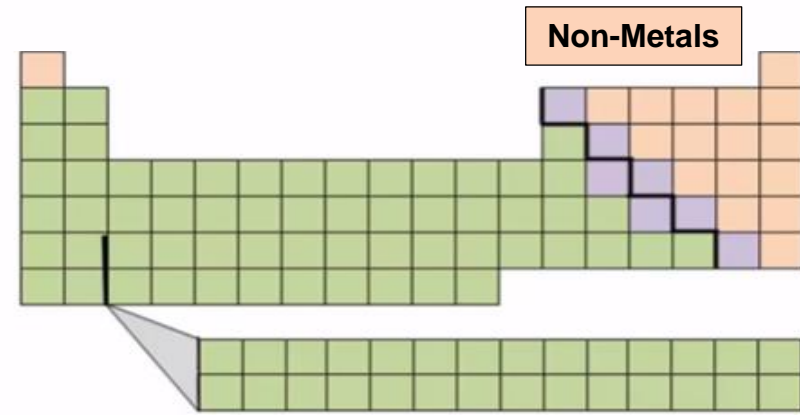
- The elements to the **left** of the “**staircase**” are the **metals**.



 Potassium 19 39.098	 Calcium 20 40.078	 Scandium 21 44.956	 Titanium 22 47.867	 Vanadium 23 50.942	 Chromium 24 51.996	 Manganese 25 54.938	 Iron 26 55.845	 Cobalt 27 58.933	 Nickel 28 58.693	 Copper 29 63.546	 Zinc 30 65.38
 Rubidium 37 85.468	 Strontium 38 87.62	 Yttrium 39 88.906	 Zirconium 40 91.224	 Niobium 41 92.906	 Molybdenum 42 95.94	 Technetium 43 98	 Ruthenium 44 101.07	 Rhodium 45 102.91	 Palladium 46 106.42	 Silver 47 107.868	 Cadmium 48 112.411
 Cesium 55 132.905	 Barium 56 137.327	 Hafnium 72 178.49	 Tantalum 73 180.948	 Tungsten 74 183.84	 Rhenium 75 186.207	 Osmium 76 192.22	 Iridium 77 192.222	 Platinum 78 195.084	 Gold 79 196.967	 Mercury 80 200.59	

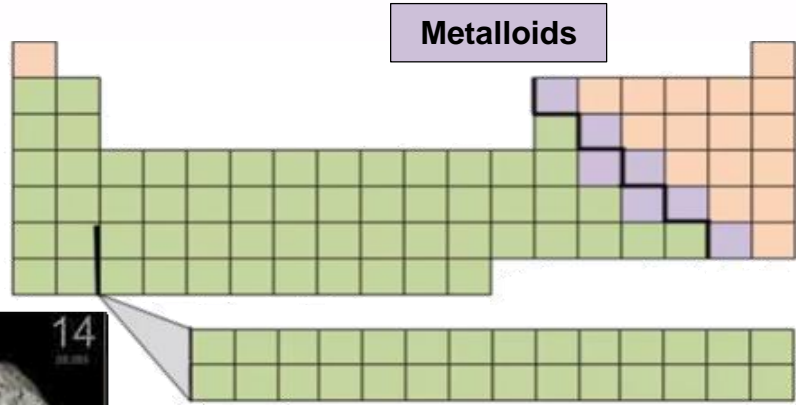
Non-Metals

								He Helium 2 4.003	
C Carbon 6 12.011	N Nitrogen 7 14.007	O Oxygen 8 15.999	F Fluorine 9 18.998					Ne Neon 10 20.180	
P Phosphorus 15 30.974		S Sulfur 16 32.065	Cl Chlorine 17 35.453					Ar Argon 18 39.948	
Se Selenium 34 78.96		Br Bromine 35 79.904							Kr Krypton 36 83.8
		I Iodine 53 126.90							Xe Xenon 54 131.29

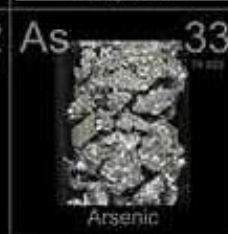


- The elements to the **right** of the “**staircase**” are the **non-metals**.

Metalloids



- The elements **touching** the “staircase” are the **metalloids**.



Check Your Understanding

Determine whether each of the following is a metal, non-metal, or metalloid:

1. An element that is shiny and a good conductor of heat _____
2. An element that is dull and does not conduct electricity _____
3. An element that is a shiny semi-conductor of electricity _____
4. An element that is a liquid at room temperature and is located to the right of the staircase on the periodic table. _____
5. An element that is a liquid at room temperature and is located to the left of the staircase on the periodic table _____

6. Sodium _____
7. Helium _____
8. Arsenic _____
9. Argon _____
10. Magnesium _____
11. Iron _____
12. Silicon _____
13. Fluorine _____
14. Calcium _____
15. Boron _____